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RECENT LITERATURE.

Memoirs of the National Academy of Sciences, Vol. V.—

The memoirs of 1891, five in number, are published in the usual quarto form under the following titles: Energy and Vision, by S. P. Langley; Contributions to Meteorology, by Elias Loomis; Report of Studies of Atmospheric Electricity, by T. C. Mendenhall; The Embryology and Metamorphosis of the Macroura, by W. K. Brooks and F. H. Herrick; On the Application of Interference Methods to Astronomical Measurements, by A. A. Nicholson. The illustrations are numerous and good.

Brooks and Bruce on the Embryology of the Macroura.¹

—The two hundred and fifty quarto pages of this memoir are not easily summarized in a page or so of THE NATURALIST, for they include a wide range of subjects. After an introduction by Professor Brooks comes an account of the life-history of *Stenopus hispidus* by Professor Herrick; next the habits and metamorphosis of *Gonodactylus chiragra* by Professor Brooks; fourth the Metamorphosis of *Alpheus sauleyi* by Brook [*sic*] and Herrick, while the bulk of the volume is taken up by Dr. Herrick's paper: *Alpheus*, a study in the development of the Crustacea, which extends from page 371 to the end.

The most interesting facts connected with the reproduction of the almost cosmopolitan *Stenopus* are the hatching of the larva as a protozoæa with enormous mandibles and its later metamorphosis into a larva with an enormously developed fifth pereopod, the use of which as a swimming organ has doubtless played an important part in the wide distribution of the species.

Much more important are the observations on *Gonodactylus*, for every fact concerning the early embryology of the Stomatopods is a positive addition to knowledge. *Gonodactylus*, like the others of its tribe, deposits its eggs at the bottom of its burrows, where they are aerated by the currents produced by the pleopoda of the parents. From these eggs the young hatches in an advanced condition, five abdominal segments with their appendages being outlined before the young escapes from the chorion. Professor Brooks was enabled by this material to conclusively show that the larval Stomatopod to which he

¹The Embryology and Metamorphosis of the Macroura, by W. K. Brooks and F. H. Herrick. Memoirs Nat. Acad. Sci., Vol. v, pp. 321-576, 57 pls. Washington, 1892.

had previously given the name *Gonerichthus* is the young of *Gonodactylus*.

The account of the various species of *Alpheus* is most detailed and one of the most striking facts brought out is that the same species in different localities may have an almost totally different development. Thus, in the Bahamas, *Alpheus heterochaelis*² hatches from the egg with all its appendages functional as far back as the third pair of maxillipeds, while the pereopoda 1, 2, and 5 are bud-like rudiments, and the joint between abdominal segment 6 and the telson has not appeared and no pleopoda are outlined. At Beaufort, N. C., the species is much more advanced before leaving the egg, but the stage at which it hatches is not directly comparable with any stage in the life history of the Bahaman form. At hatching all the appendages of the adult are present, and all become functional after the first molt. In the Bahamas there is a long series of larval stages, while at Beaufort there is a great acceleration, and even this is not all; the Beaufort stages are so modified that at no time can exact parallels be drawn between them and the more southern form. In the Bahamas there are three, then four, then five, and then seven schizopodal feet with functional exopodites, while at Beaufort there are never more than three. Yet these different types of metamorphosis result in the production of adults which are almost exactly alike. It must be noted that Packard has described still another type of development for what he regards as the same species at Key West. For the details of the development of the different species of *Alpheus* studied we have but little room; those interested must seek the memoir itself. The segmentation in *A. sauleyi* and *A. heterochaelis* is typical centrolecithal, with the formation of yolk pyramids; in *A. minus* it is irregular and has no yolk pyramids, but the statement (pp. 427 and 457) that it is amitotic deserves further investigation. All of the nuclei resulting from segmentation migrate to the surface and there by delamination they produce "wandering cells" which pass into the yolk and give rise to both mesodermal and entodermal structures. The subject of degeneration of certain nuclei is also very interesting. Dr. Herrick has carefully followed the increase of nuclei in the various parts of the embryo, and has plotted curves illustrating the distribution of primary yolk nuclei, of wandering cells,

²There is a great diversity in this memoir as to the spelling of various scientific terms. Thus we have usually *heterochelis* regardless of the fact that Say, who described the species, wrote *heterochaelis*; *Alpheus minus* appears as *minus*, *minos* and *minor*; centrolecithal sometimes as centrollycethal; *Lúcifer* as *Leucifer*.

and of all other cells, from which the reader can almost reconstruct the eggs for himself.

Only a few points more can be noted in the later history. The mouth invagination occurs on a line between the bases of the antennular buds; the history of the eye is followed, the author agreeing well in most points with Parker, but affording little support to Watase's theoretical views. The antennal gland (green gland) is regarded as mesodermal, but its opening was not found even in the larval stages; the alimentary canal proper is almost wholly made up from stomodeal and proctodeal invaginations, the true entoderm, which arises by the migration of yolk cells to the posterior end of the yolk being chiefly confined to the hepato-pancreatic diverticula and their ducts.

The greatest fault which one can find with the paper is that which is due to its composite nature, the result being an apparent lack of arrangement, so that it is difficult to follow in detail certain structures. This possibly was unavoidable where two authors were each contributing their parts and also where the composition of the text was done at different times. The volume is filled with valuable facts and cannot be ignored by the student of Crustacean ontogeny. It is by far the most valuable zoological memoir yet published by the National Academy.

Campbell's Biology.³—It is rarely that such a veritable hodge podge as this comes to our table. It is an example of absorption without assimilation on the part of the author. The plan of the work is fairly good but it is a misfortune for any student to have it as a guide in his studies. It is worse than the notorious works by the late Dr. Steele, for their faults were largely negative; they taught absolutely nothing good or bad, but this is "filled with lots of things that are not so." The work intends to be a companion to the laboratory work, and gives much space to protoplasm, the cell and the like, and then takes up without any apparent order the structures and classification of animals and plants. A few passages out of over a hundred which we have marked will illustrate the chief shortcomings of the work.

P. 137. The lungs "develop as an outgrowth of the alimentary canal. This outgrowth becomes completely separated off from the oesophagus, and at its lower end divides into two or more tubes, which communicate with the pharynx by a single tube, the trachea."—Pp. 145-6. The statement is made without a single qualification that the ureter of ver-

³Text book of Elementary Biology, by H. J. Campbell, M. D., Lond. London, Swan Sonnenschein, New York, Macmillan & Co., 1893. 12 O., pp. xii + 284.